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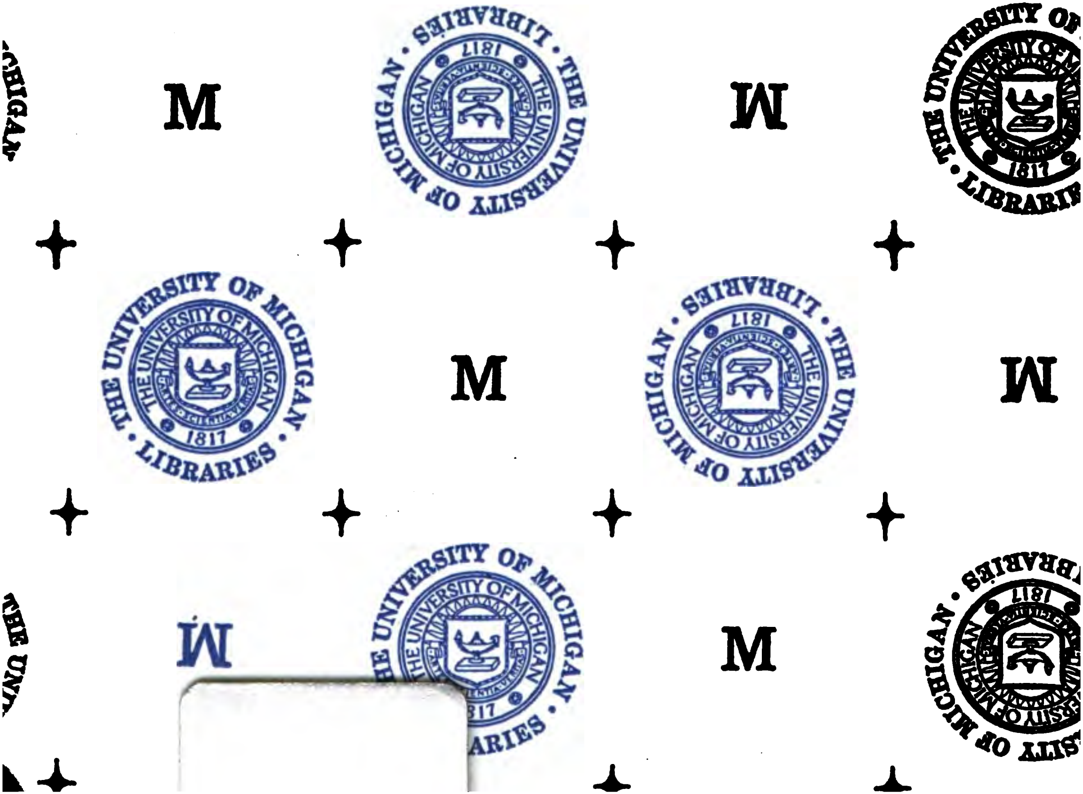

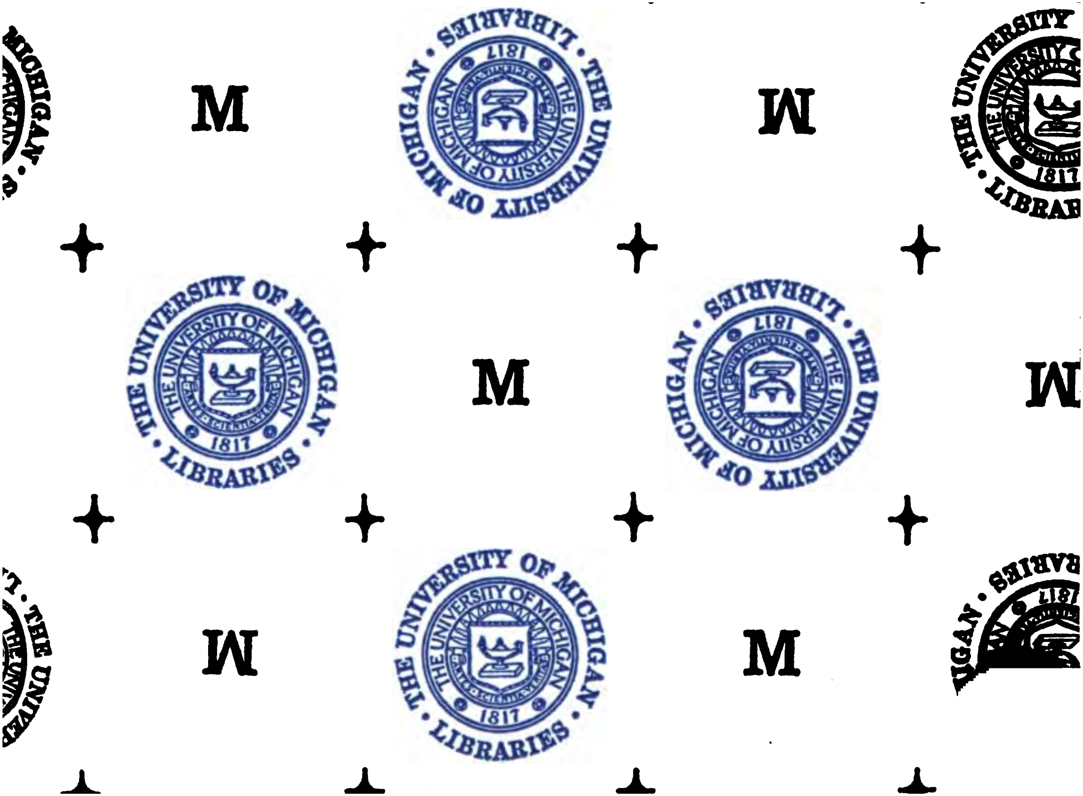
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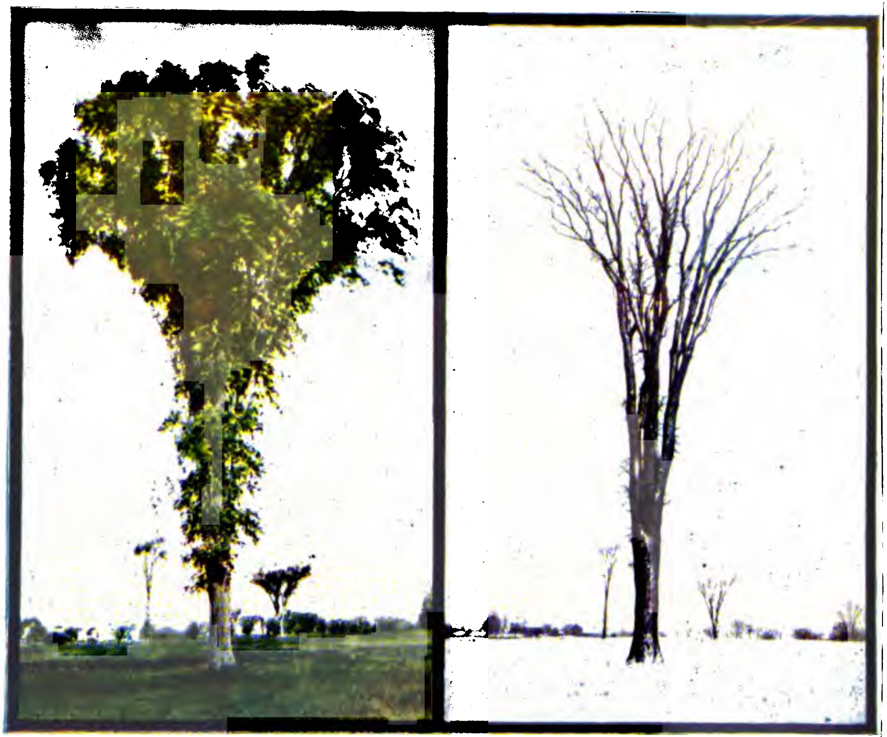

WHITE ELM IN SUMMER AND IN WINTER

LEAF KEY TO [illegible]

NORTHERN STATES [illegible]

BOTANICAL [illegible]

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LEAF KEY TO THE TREES,

OF THE

NORTHERN STATES AND CANADA,

AND A

BOTANICAL GLOSSARY.

BY

ROMEYN BECK HOUGH.

Author of

AMERICAN WOODS and

HANDBOOK OF TREES, Photo-descriptive.

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PREFACE.

In this Leaf Key we have aimed to include all of the generally accepted native and naturalized trees north of the latitude of the northern boundary of North Carolina and east of the Rocky Mountains. To form a key, however, that would fit all of the unusual or non-typical forms of leaves of each species would seem to be a hopeless task, but to make one fit the typical leaves — such as we consider as distinctive of the various species and by which we recognize them — seems possible and has been here attempted.

This limitation — to normal, typical leaves — must be borne in mind in using the key and only such leaves selected for identifiaction as we would consider average specimens on a mature tree, not those on very young or excessively vigorous shoots. At the same time specimens of the fruit should be secured or observed if possible, as brief descriptions of the fruits have been included, either as an essential or an accessory part of the key; though many species can be readily traced without referring to the fruits.

In such an effort as this, where the greatest definiteness possible must be conveyed, the use of certain few technical terms is unavoidable, but they are few in number, and, for the convenience of those who may want them defined, a glossary (really much more comprehensive than here required) has been appended to the key. The exact meaning of the few used should be clearly understood at the outset.

Unfortunately there are certain technical terms that have come to be applied too

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loosely by botanical writers, and hence have lost to a certain extent their definiteness. That such of those as are used in the present work may be understood in their strict sense, as intended, a little explanation is necessary. We say of a leaf-margin that it is "serrate" (from L. *serra, a saw*) when it is toothed with sharply-pointed teeth directed forward, *i. e.*, towards the tip of the leaf. It is "crenate" (from L. *crena, a notch*) when the teeth are rounded at apex and directed outward rather than forward, *i. e.*, the margin is scalloped. Forms intermediate between the above are spoken of as "crenate-serrate." The margin is "dentate" when the teeth are distinctly pointed and directed outward, from a rather wide base. Intermediate forms may be *crenate-dentate*, or may be "*serrate-dentate.*" We trust further definitions may be understood by reference to the glossary.

It must not be understood that this Leaf Key is intended to take the place of more extensive publications on our trees, but rather to supplement them — to enable one to have in compact and systematic form an aid in the identification of trees by a study of their leaf characters.

LOWVILLE, N. Y., *July* 15, 1910.

A KEY BASED UPON LEAVES.

Abbreviations. — a. = apex or at apex; ab. = above; b. = base or at base; bn. = beneath; fr. = fruit; l. = long (usually omitted and implied after dimensions); lf. = leaf; lfts. = leaflets; lvs. = leaves.

a SIMPLE LEAVES,

b With well marked blade and petiole, or without petiole (sessile);

c MAIN RIB SINGLE — PINNATELY VEINED

d *Margin entire;*

e Leaves lance-oblong, thick,

f Acuminate at both ends, 3–9 in.,

g Rugose-reticulate, deciduous; fr. an elongated dry drupe.
CORK-WOOD (*Leitneria floridana*).

g^2 Smooth and lustrous; fr. a dark blue drupe; veins beneath and petioles

h Rusty tomentose, evergreen..........SWAMP BAY (*Persea pubescens*).

h^2 Glabrous or nearly so, evergreen............RED BAY (*P. Borbonia*).

f^2 Acute at both ends, 1½–4 in.; fr. an acorn.
WILLOW OAK (*Quercus Phellos*).

e^2 Leaves lance-obovate, cuneate, rounded a., mostly

f Clustered on lateral spurs; fr. a black drupe; beneath and petioles

g Densely tomentose...........Woolly Buckthorn (*Bumelia lanuginosa*).

g^2 Glabrous or nearly so.............Southern Buckthorn (*B. lycioides*).

f^2 Alternate on the branchlets.

g Thinnish, glabrous above, deciduous; fr. 2-celled capsules. Leatherwood (*Cyrilla racemiflora*).

g^2 Very thick, lustrous above, persistent; fr. acorn. Live Oak (*Quercus Virginiana*).

e^3 Leaves ovate,

f Inequilateral, long taper-pointed and narrow; fr. drupe. Mississippi Hackberry (*Celtis mississippiensis*).

f^2 Equilateral, broad, lustrous ab. rounded b., long-acuminate; fr. compound, orange-like.......................Osage Orange (*Toxylon pomiferum*).

e^4 Leaves ovate-oblong, abruptly narrowed b.

f Alternate, acuminate, lustrous dark gr. ab., paler pubescent bn.; fr. large berry............................Persimmon (*Diospyros Virginiana*).

f^2 Opposite, rough-pubescent above, without stipules; fr. drupe. Rough-leaved Dogwood (*Cornus asperifolia*).

f^3 Verticillate (some opposite) glabrous ab., with stipules; fr. in globular head........................Button-bush (*Cephalanthus occidentalis*).

e^5 Leaves oblong, mostly cuneate b.,

f Deciduous.

g Alternate, acute or obtuse both ends, glabrous ab.; fr. acorn.
SHINGLE OAK (*Quercus imbricaria*).

g2 Opposite, acute or acuminate both ends; fr. drupe.
FRINGE-TREE (*Chionanthus Virginica*).

f2 Persistent, thick and coraceous, clustered near tips of branchlets,

g Obtuse or acute both ends,

h Broad, lustrous ab., white bn.; fr. aggregation of follicles.
SWEET BAY (*Magnolia glauca*).

h2 Narrow, glabrous ab., paler bn.; fr. capsule.
ROSE BAY (*Rhododendron maximum*).

g2 Acuminate both ends; fr. capsule..MOUNTAIN LAUREL (*Kalmia latifolia*).

e6 Leaves obovate-oblong,

f Narrow and sometimes falcate; fr. acorn.
LAUREL OAK (*Quercus laurifolia*).

f2 Wider, coriaceous, lustrous ab., acute or acuminate; fr. drupe.
SOUR GUM (*Nyssa sylvatica*).

e7 Leaves obovate,

f Large (3–20 in.) membranaceous.

g Cuneate b.,

h Short acuminate, 8–12 in. narrow; fr. fleshy baccate.
PAPAW (*Asimina triloba*).

h2 Acute to obtuse a., 12–20 in.; fr. aggregation follicles.
UMBRELLA-TREE (*Magnolia tripetala*).

g^2 Ear-lobed b.; fr. aggregation follicles.
  h 10–12 in. long........................Fraser Magnolia (*M. Fraseri*).
  h^2 15–30 in. long..............Large-leaf Magnolia (*M. macrophylla*).
f^2 Small (4–6 in.) cuneate.
  g Membranaceous, wide, rounded a., glabrous ab.; fr. drupelet.
American Smoke Tree (*Cotinus Americanus*).
  g^2 Coriaceous, narrow, mostly acute; fr. drupe.
Water Gum (*Nyssa biflora*).
e^8 Leaves oval, membranaceous, deciduous.
  f Rounded or subcordate b., 7–10 in.; fr. aggregation follicles.
Cucumber-tree (*Magnolia acuminata*).
  f^2 Cuneate b., acuminate a., veins arcuate.
    g Alternate or clustered; fr. blue drupe.
Blue Dogwood (*Cornus alternifolia*).
    g^2 Opposite or clustered; fr. red drupe.
Flowering Dogwood (*Cornus florida*).
d^2 *Margin both entire and dentate or denticulate; leaves*
  e Linear-lanceolate, 2–5 in., entire or remotely denticulate; fr. capsule.
Sandbar Willow (*Salix fluviatilis*).
  e^2 Oblanceolate, 3–5 in., entire or remotely serrate, fragrant; fr. small drupe.
Wax Myrtle (*Myrica cerifera*).
  e^3 Lance-obovate, cuneate b., rounded to acute a., entire or appressed-serrate, evergreen; fr. drupaceous..............Cassena Holly (*Ilex cassine L.*).

e^4 Ovate-oblong, 5–10 in., acuminate with long stems and both entire and with from 1–5 large pointed teeth; fr. drupe.
COTTON GUM (*Nyssa aquatica*).

e^5 Oblong, acute to acuminate both ends, entire and irregularly serrulate, 3–7 in., glaucous bn.; fr. capsule...........SORREL-TREE (*Oxydendrum arboreum*).

e^6 Obovate-oblong, cuneate to rounded b., 1–3 in., whitish pubescent bn.; fr. capsule..............................BEBB'S WILLOW (*Salix Bebbiana*).

e^7 Elliptical, very thick and firm, glabrous, with few remote spine-tipped teeth, evergreen; fr. drupe...............................HOLLY (*Ilex opaca*).

e^8 Obovate, ½–2 in., subsessile, firm thick and lustrous, entire and obscurely denticulate; fr. berry...............SPARKLEBERRY (*Vaccinium arborem*).

d^3 *Margin both entire and lobed,* the latter mostly on vigorous shoots, very short-stemmed; the entire leaves are

e Lance-obovate to spatulate, cuneate b., wide and rounded or obscurely 3 lobed a. (other leaves sharply pinnately 3–7-lobed) tardily deciduous; fr. acorn.................................WATER OAK (*Quercus nigra*).

e^2 Ovate-oblong, 2–7 in., abruptly narrowed b., acute or obtuse a. (other leaves with large lobe on one or both sides); fr. drupe.
SASSAFRAS (*Sassafras sassafras*).

e^3 Broad-ovate, large, long-stemmed, the lowest pair of veins branching; arrangement

f Ternate (some opposite) subcordate, acute or acuminate, pith of twigs not segmented; fr. pod-like; leaves

g Acute or short acuminate; fringe of hairs on seeds pointed.
CATALPA (*Catalpa catalpa*).

g^2 Long-acuminate, fringe of hairs of seeds wide.
HARDY CATALPA (*Catalpa speciosa*).

f^2 Opposite, cordate., acute or bluntly pointed, pith of twigs segmented; fr. capsule......................**PRINCESS TREE** (*Paulownia tomentosa*).

d^4 *Margin serrate or serrulate,*

e Leaves inequilateral, alternate;

f Petioles short, veins impressed above and

g Parallel; mostly doubly serrate, firm

h Smooth above; fr. samara; branchlets

i Not corky-winged; leaf-buds smooth and blunt.
WHITE ELM (*Ulmus Americana*).

i^2 Some corky-winged; leaf-buds acuminate, puberulous;

j Leaves 2–6 in.; a northern tree......**CORK ELM** (*Ulmus Thomasi*).

j^2 ¾–3 in.; a southern tree...........**WINGED ELM** (*Ulmus alata*).

h^2 Very rough above.; fr. samara......**SLIPPERY ELM** (*Ulmus pubscens*).

g^2 Not parallel, arcuate and ramose; simply serrate, thin; fr. drupe.
HACKBERRY (*Celtis occidentalis*).

f^2 Petioles long; veins little if at all impressed, arcuate, ovate-orbicular, prominently reticulated; fr. nut-like with parachute.

g Leaves smooth and greenish beneath......**BASSWOOD** (*Tilia Americana*).

g^2 Leaves silvery-pubescent beneath, with small if any axillary tufts.
WHITE BASSWOOD (*T. heterophylla*).

g^3 Leaves stellate-pubescent beneath, with conspicuous axillary tufts.
MICHAUX'S BASSWOOD (*T. Michauxii*).

g^4 Leaves rusty-pubescent beneath; a southern tree.
DOWNY BASSWOOD (*T. pubescens*).

e^2 Leaves equilateral or nearly so; fr. a

f Drupe with juicy acidulous flesh; leaves alternate; pit of drupe

g Bony, hard and

h Pit more or less flattened and with ventral groove; leaves

i Lance-oblong, tapering b., membranaceous,

j Long-acuminate, light green and sharply serrate; pit deeply wrinkled........................PEACH (*Amygdalus Persica*).

j^2 Acute or apiculate, glandular serrate, infolded lengthwise; pit nearly smooth........CHICKASAW PLUM (*Prunus augustifolia*).

i^2 Lance-ovate, rounded or tapering b., long-acuminate, closely glandular serrate, firm; mid-rib hairy bn.
WILD GOOSE PLUM (*Prunus hortulana*).

i^3 Ovate-oblong,

j 2½–5 in., veins strongly impressed ab. and prominent bn.; rounded or obtuse b.

k Sharply and sometimes doubly serrate; stems mostly glandless.
AMERICAN WILD PLUM (*Prunus Americana*).

k² Bluntly serrate; stems with glands near blade.

CANADA PLUM (*Prunus nigra*).

j² 1½–3 in. long, thick and firm; fr. blue-black or purple with bloom; leaves with

k Rounded or obtuse b.; fr. ½ in. or less, dark purple.

ALLEGHANY SLOE (*Prunus Alleghaniensis*).

k² Cuneate b., wrinkled; fr. ¾–1 in., blue with bloom.

GARDEN PLUM (*Prunus domestica*).

h² Pit turgid (nearly subglobose) marginless; leaves

i Lance-oblong (occasionally wider) rounded or obtuse b. acuminate

j Membranaceous; cherries small, translucent, red, in clusters, and very tart..............PIGEON CHERRY (*Prunus Pennsylvanica*).

j² Firm, with glandular incurved teeth; cherries purple-black, in racemes and of pleasant vinous flavor.

BLACK CHERRY (*Prunus serotina*).

i² Obovate-oblong, rounded or obtuse b.

j Bluntly and unevenly serrate; fr. single or few in cluster;

k Leaves thin and drooping; fr. sweet.

SWEET CHERRY (*Prunus Avium*).

k² Leaves thickish and little if at all drooping; fr. tart.

SOUR CHERRY (*Prunus Cerasus*).

j² Sharply and evenly serrate; fr. in racemes, about ¼ in. and astringent...............CHOKE CHERRY (*Prunus Virginiana*).

g^2 Pit horny and yielding, flat; flesh blackish and sweet; lvs. opposite, finely and sharply serrate.

h Acute or obtuse a., tapering b.,

i Smooth bn.; petioles not winged.
BLACK HAW (*Viburnum prunifolium*).

i^2 With rufous hairs bn. on midrib and principal veins; petioles little if at all winged......RUSTY NANNYBERRY (*Viburnum rufidulum*).

h^2 Acuminate, rounded b., black-dotted beneath; petioles slightly winged.
NORTHERN NANNYBERRY (*Viburnum Lentago*)

f^2 Drupe-like, but containing 2–6 one-seeded nutlets; lvs. lanceolate to oblong, membranaceous and markedly wrinkled.
MOUNTAIN HOLLY (*Ilex monticola*).

f^3 A pome (apple); leaves ovate to oblong or oval, firm, mostly rounded b. and leaf stalks

g Slender, long and smooth.

h Leaves glabrous ab. and usually bn., sharply and widely serrate; fr. ½ in. or less, in loose racemes.
SERVICE-BERRY (*Amelanchier Canadensis*).

h^2 Leaves lustrous ab., smooth bn., appressed serrate or subentire; fr. usually tapering to the stem, containing grit cells.
PEAR (*Pyrus communis*).

g^2 Short, stout, gray-tomentose as is the under surface of lvs.; fr. hollowing at stem and without grit-cells............APPLE (*Pyrus Malus*)

f^4 Capsule, which is

g 1-celled, dehiscent by 2 valves, ¼ in. or less 1; seeds with silky hairs;

h Leaf-buds covered with single scale; leaves

i Linear-lanceolate, very long taper-pointed and drooping. WEEPING WILLOW (*Salix babylonica*).

i^2 Narrow-lanceolate, green bn.; petioles not glandular; finely serrate. BLACK WILLOW (*Salix nigra*).

i^3 Lanceolate; petioles

j Glandular; glabrous bn., coarsely serrate; branchlets greenish and very brittle.. ....BRITTLE WILLOW (*S. fragilis*).

j^2 Not glandular; pale bn.; stipules.

k Foliaceous; branchlets hoary-pubescent. WARD'S WILLOW (*Salix longipes*).

k^2 Deciduous; leaves

l Glabrous ab., whitish and glaucous bn.; branchlets yellow. YELLOW WILLOW (*S. vitellina*).

l^2 Silky-pubescent both sides; branchlets greenish. WHITE WILLOW (*S. alba*).

i^4 Broad lanceolate, smooth above, pale and glaucous bn.; petioles long and not glandular....PEACH-LEAF WILLOW (*Salix amygdaloides*).

i^5 Lance-ovate, very lustrous dark green ab., firm; petioles glandular. SHINING WILLOW (*S. lucida*).

i^6 Oblanceolate and lanceolate, pale bn., finely serrate; stipules foliaceous; branchlets first season and buds hairy.
Missouri Willow (*S. Missouriensis*).

i^7 Ovate-oblong, rounded or subcordate b., acute a.
Balsam Willow (*Salix basamifera*).

h^2 Buds covered by several scales;

i Leaves lanceovate, cuneate or rounded b., bluntly pointed a.
Narrow-leaf Cottonwood (*Populus augustifolia*).

i^2 Leaves ovate-orbicular, subcordate.
Tweedy's Cottonwood (*P. Tweedyi*).

g^2 5-celled, dehiscent by 5 valves; leaves lance-obovate to oblong, tapering both ways, remotely serrate above the middle and

h Persistent, thick, coriaceous; seeds winged.
Loblolly Bay (*Gordonia Lasianthus*).

h^2 Deciduous, membranaceous; seeds not winged.
Franklinia (*Franklinia Altamaha*).

f^5 Nutlet,

g Not winged, each

h Subtended by a 3-lobed leaf-like bract and arranged in aments; lvs. unequally and sharply serrate, glabrous bn. except for silky hairs in the axils of veins...........Blue Beech (*Carpinus Caroliniana*).

h^2 Enclosed in a membranous sac and arranged in loose cone-like aments; leaves ovate-oblong, unequally and sharply serrate, pubescent bn.
Ironwood (*Ostrya Virginiana*).

g² Winged both sides and borne in the axils of scales which form a cone; scales

h 3-lobed, thin and falling away at maturity of seed;

i Bark chalky white and peeling in strips around the trunk; lvs.

j Ovate, rounded or obtuse b., acuminate a.; bark peeling readily. CANOE BIRCH (*Betula papyrifera*).

j² Deltoid, long-acuminate, petioles long and slender; bark peeling with some difficulty........WHITE BIRCH (*Betula populifolia*).

i² Bark smooth, lustrous reddish brown; lvs. broad ovate. WESTERN RED BIRCH (*B. fontinalis*).

i³ Bark scaly, gray-brown; lvs. ovate-oblong, narrow and rounded or subcordate b., aromatic when bruised. SWEET BIRCH (*Betula lenta*).

i⁴ Bark silvery yellow, separating in thin layers and hanging in curls; lvs. ovate-oblong, narrow and mostly heart shaped b., aromatic. YELLOW BIRCH (*Betula lutea*).

i⁵ Bark reddish brown, separating in thin persistent scales; lvs. rhombic ovate....................................RIVER BIRCH (*B. nigra*).

h² Thickened, woody and persistent; lvs.

i Ovate-oblong, mostly acute or acuminate a., lustrous dark green ab.; fls. in late summer............SEA-SIDE ALDER (*Alnus maritima*).

i² Orbicular-obovate, rounded to notched a., dull green ab.; fls. in early spring......................EUROPEAN ALDER (*Alnus glutinosa*).

f^6 Nut.

g Enveloped by a 2–4-valved prickle-covered involucre, lateral veins of lvs. straight, parallel, and each terminating in a tooth; nut

h Triangular, each involucre inclosing a pair; lvs. ovate-oblong, acuminate, hairy along veins bn..............BEECH (*Fagus Americana*).

h^2 Globose — top-shaped, single in involucre; lvs. narrow-oblong with slender teeth and white-tomentose bn.
CHINQUAPIN (*Castanea pumila*).

h^3 Compressed ovoid-globose, 2 or 3 in an involucre; lvs. lance-oblong with coarse teeth, green and glabrous both sides.
CHESTNUT (*Castanea dentata*).

g^2 Subtended by an involucral cup — an acorn; lvs. lance-oblong, obovate, coarsely and sharply serrate;

h Large trees..................CHINQUAPIN OAK (*Quercus acuminata*).

h^2 Shrubs or very small trees...DWARF CHINQUAPIN OAK (*Q. prinoides*).

d^5 ***Margin both serrate or serrate-dentate and lobed in the same lvs.***, though the lobed lvs. may be on vigorous shoots only, and the latter lvs, are not considered in these further descriptions.

e Fruit a small pome (apple)

f With 1–5 bony, 1-seeded nutlet-like carpels; small trees and shrubs with thorny branches; lvs.

g Obovate (large ones more elliptical) entire, cuneate b., rounded or acute a.; petioles short, winged above and glandless;

h Leaves lustrous dark-green ab., thick; fr. globose-oblong, ½ in., dull red; nutlets 1–3..........COCK-SPUR THORN (*Crataegus crus-galli*).

h^2 Leaves dull gray-green ab., more membranaceous; fr, subglobose, ½–1 in., dull red or yellow with white dots.
Dotted Thorn (*C. punctata*).

g^2 Obovate-oblong, wider and short cuneate b., petioles longer and winged ab.

h Irregularly serrate-dentate, acute or blunt-pointed and slightly, if at all, lobed, dark green and smooth ab.; fr. scarlet or orange, ¼ in. or less; nutlets usually 5..............Southern Thorn (*C. viridis*).

h^2 Crenate-serrate or with short crenate toothed lobes, rounded or obtuse a.; fr. oblong-globose, ½ in., dark red or orange, black dotted, with 2–3 nutlets..................Margaretta Thorn (*C. Margaretta*).

h^3 With short acute-toothed lobes or doubly serrate-dentate, obtuse to acute a., pubescent bn. 2–5 in.; petioles glandular; fr. oblong-globose, ½ in.; nutlets 2–3 with ventral cavities.
Pear Thorn (*C. tomentosa*).

g^3 Obovate-orbicular, rounded or obtuse a., coriaceous, coarsely and irregularly serrate-dentate, or very slightly lobed; thorns 2½–4 in.; fr. lustrous crimson, ¼–½ in., subglobose, on erect stems; nutlets with deep ventral cavities....Long-spine Thorn (*Crataegus macracantha*).

g^4 Leaves broad-ovate;

h Waxy-coated, slightly 5-angled and flattened subglobose, apple-green becoming purplish red; lvs. subcordate b., acute, with 3 or 4 pairs short pointed lobes, thickish..........Waxy Thorn (*C. pruinosa*).

h^2 Fruit pubescent at least at the ends, i Subglobose, ¾–1 in., in small drooping villous clusters; calyx-lobes large and deciduous; nutlets 4 or 5; lvs. truncate or subcordate b., with appressed pubescence ab., pubescent bn.

Red-fruited Thorn (*C. mollis*).

i^2 Obovoid-oblong, in erect compact clusters with prominent and persistent calyx-lobes and tube; lvs. rounded b., acute or obtuse a.

Champlain Thorn (*C. Champlainensis*).

h^3 Smooth and lustrous, about ¾ in.; lvs. scabrous ab.; fr.

i Orange red with pale dots, obovoid, calyx-lobes enlarged and persistent; lvs. thickish..........Red-fruited Thorn (*C. submolis*).

i^2 Bright scarlet with dark dots; lvs. membranaceous.

Scarlet Thorn (*C. pedicellata*).

g^5 Triangular-ovate, 1½–3 in., truncate b., acute or acuminate a., lustrous dark green ab., coarsely serrate-dentate and incisely 3–5-lobed.

Washington Thorn (*C. cordata*).

g^6 Oval to orbicular.

h Membranaceous, hairy on veins bn.,

i Rounded or obtuse a. and b., sharply serrate with 2–3 short lobes, glabrous yellow-green ab., paler and concave bn.

Pringle's Thorn (*C. Pringlei*).

i^2 Acute or acuminate a., rounded b., sharply serrate-dentate, and with 3 or 4 pairs short lobes, scabrous ab., pubescent on veins bn.

Holme's Thorn (*C. Holmesiana*).

h^2 Coriaceous, finely doubly serrate-dentate.
Scarlet Thorn (*C. coccinea*).

f^2 With 5 papery usually 2-seeded carpels; small flat waxy fragrant apples; lvs.

g Tomentose or pubescent bn., oblong-ovate to oval,

h Crenate-serrate and usually with short crenate lobes; fr. stems slender and glabrate........................Prairie Crab (*Pyrus Ioensis*).

h^2 Crenate and very much wrinkled; fr. stems short.
Soulard Crab (*Pyrus Soulardi*).

g^2 Glabrous throughout, with long slender stems; fr. hard translucent long-stemmed and calyx-lobes.

h Deciduous; fr. yellowish, red-cheeked, scarcely waxy and but little hollowed at b.; lvs. ovate-oblong serrate or sometimes entire, not lobed............................Siberian Crab (*Pyrus baccata*).

h^2 Persistent in fruit; fr. yellow-green, waxy, deeply hollowed at b., very sour; lvs. triangular ovate to trucate or subcordate b., acute a., serrate-dentate and usually with few short lobes.
Fragrant Crab (*Pyrus coronaria*).

e^2 Fruit a juicy syncarp (blackberry-like), edible; lvs. with arcuate lateral veins, the lowermost pair branching; lvs.

f Lustrous ab., glabrous bn., broad-ovate, coarsely serrate; fr. pinkish white.
White Mulberry (*Morus alba*).

f^2 Dull dark green and roughish ab., pubescent and strongly reticulate bn., orbicular ovate; petioles glabrate; fr. purple-black.

RED MULBERRY (*Morus rubra*).

e^3 Fruit a globular head with seeds exserted on red fleshy stipes; lvs. rough ab., under surface and petioles velvety-pubescent.

PAPER MULBERRY (*Broussonetia papyrifera*).

d^6 *Margin crenate-serrate;*

e Leaves opposite, mostly

f Oblong, tapering b., acuminate; small trees and shrubs; lvs.

g Glabrous bn., 2–3 in.; inhabits wet lowlands; fr. drupe.

SWAMP PRIVET (*Forestiera acuminata*).

g^2 Pubescent bn., 2–5 in., membranaceous and very finely crenate-serrate; an upland tree; fr. fleshy capsule.

BURNING BUSH (*Euonymus atropurpureus*).

f^2 Broad-ovate to oval, 1½–5½ in., rounded b., obtuse to acute a., the lateral veins very prominent and arcuate; fr. drupe-like.

BUCKTHORN (*Rhamnus cathartica*).

e^2 Leaves alternate,

f Lance-ovate, rounded or apiculate a.; fr. a small flt waxy-coated apple.

NARROW LEAF CRAB (*Pyrus angustifolia*).

f^2 Lance-oblong, finely rugose ab., glaucous bn.; fr. a small capsule with cotton-tufted seeds.................GLAUCOUS WILLOW (*Salix discolor*).

f³ Lance-obovate, 4–6 in., cuneate b., acute or acuminate a., very lustrous ab., thick and with short stems; fr. dry drupe.
Sweet Leaf (*Symplocos tinctoria*).

f⁴ Rhombic-lanceolate to ovate, with long slender stems, cuneate to nearly rounded b., acuminate a.; a tree of the eastern foot-hills of the Rocky Mountains; fr. capsule...**Lance-leaf Cottonwood** (*Populus acuminata*).

f⁵ Ovate, cuneate to rounded b., acute to acuminate, strongly reticulate, whitish and often rusty bn.; fr. capsule.
Balsam Poplar (*Populus balsamifera*).

f⁶ Heart-shaped, 3–8 in., with long round stems; fr. capsule; lvs.

g Acuminate, whitish and often rusty bn.
Balm-of-Gilead (*Populus candicans*).

g² Obtuse to subacute a., hairy bn. and on stems.
Swamp Poplar (*Populus heterophylla*).

f⁷ Ovate-oblong, 1–3 in., rounded or obtuse and more or less inequilateral b.; fr. coriaceous drupe..................**Planer-tree** (*Planera aquatica*).

f⁸ Oblong, 2–4 in., acute or rounded both ends, lustrous and veins impressed ab., obscurely crenate-serrate; a very small tree or shrub of the southern states; fr. drupe-like......**Yellow Buckthorn** (*Rhamnus Caroliniana*).

f⁹ Obovate, 4–8 in., obtuse or acute b., acute or acuminate a., regularly crenate; fr. an acorn....................**Cow Oak** (*Quercus Michauxii*).

f¹⁰ Deltoid-ovate, truncate or wide cordate b., acute or short-acuminate, stems long and laterally compressed; fr. capsule.
Cottonwood (*Populus deltoides*).

f^{11} Orbicular-ovate, 1–2 in., rounded to subcordate b., obtuse to acute or apiculate a., glabrous and fragrant; fr. drupe.
PERFUMED CHERRY (*Prunus Mahaleb*).

d^7 *Margin crenate or crenulate; lvs.*

e Lance-obovate, 1½–3 in., cuneate b., rounded, obtuse or notched a.; fr. drupe-like..SWAMP HOLLY (*Ilex decidua*).

e^2 Oblong, 1–2 in., thick, evergreen; fr. a bright red drupe-like berry; fr. drupe-like..YAUPON (*Ilex vomitoria*).

e^3 Suborbicular, 1½–3 in., rounded or obtuse b., abruptly acute or short acuminate, finely crenate; petioles long and compressed laterally; fr. capsule.
QUAKING ASP (*Populus tremuloides*).

e^4 Broad-deltoid or rhombic, blade commonly wider than long, cuneate to truncate b., short acuminate or acute a.; petioles long, laterally compressed; fr. capsule; branches

f Spreading..BLACK POPLAR (*Populus nigra*).

f^2 Strictly upright........................LOMBARDY POPLAR (*Populus dilatata*).

d^8 *Margin dentate,*

e Finely dentate, mostly oblong, acute or obtuse b., acuminate a., with prominent arcuate veins; fr. dry winged drupe.
SILVER-BELL TREE (*Mohrodendron Carolinum*).

e^2 Coarsely dentate, broad-ovate to orbiculer; petioles

f Laterally compressed and long, blades rounded b., acute or short acuminate a., glabrous and firm (white velvety when young); fr. capsule.
LARGE-TOOTH POPLAR (*Populus grandidentata*).

f^2 Terete, slender and short, blades mostly rounded or obtuse both ends, membranaceous; fr. drupe-like.
Western Serviceberry (*Amelanchier alnifolia*).

d^9 *Margin sinuate or sinuate-dentate,*

e Lance-oblong to ovate, obtuse to subcordate b., bluntly acute a., with 10–16 pairs of straight lateral veins...............Rock Oak (*Quercus Prinus*).

e^2 Obovate-oblong, cuneate b., rounded or obtuse a., 6–8 pairs of lateral veins, whitish bn...................Swamp White Oak (*Quercus platanoides*).

e^3 Oval-obovate, rounded or subcordate b., rounded to acute or apiculate a., membranaceous; petioles short and thick; fr. woody capsule.
Witch Hazel (*Hamamelis Virginia*).

e^4 Suborbicular (on vigerous shoots 3–5-lobed) 2–4 in., dark green ab., white velvety tomentose bn. on stems, etc.; fr. capsule....Abele (*Populus alba*).

d^{10} *Margin lobed;* fruit a

e Small apple, containing a single 2-seeded bony nutlet; branchlets thorny and lvs. with 1–3 pairs of wide-spreading lobes.
Hawthorn (*Crataegus Oxyacantha*).

e^2 Narrow upright cone, made up of closed carpels; lvs. with one or two pairs of wide-spreading entire lobes and turcate or with wide sinus at apex.
Tulip Tree (*Liriodendron tulipifera*).

e^3 Acorn; lvs. pinnately lobed and

f Lobes bristle-tipped; acorns maturing in the autumn of the second year; sinuses

g Narrow at bottom; lobes wide at base and narrowing towards apex; lvs.

h Oval to ovate, lobes 4–5 pairs, each lobe with

i One to three sharp teeth; fruit

j Scarcely ¼ enveloped by its shallow saucer.
RED OAK (*Quercus rubra*).

j^{2} Half enveloped by its deep saucer.
GRAY OAK (*Q. borealis*).

i^{2} Entire, triangular and wide-spreading.
SWAMP SPANISH OAK (*Quercus pagodaefolia*).

h^{2} Obovate and lobes generally in

i Four pairs, symmetrically arranged, the larger lobes 1–4 toothed.
YELLOW OAK (*Q. velutina*).

i^{2} One to three pairs,

j Not symmetrically arranged, lobes scarcely dentate and those of some lvs. finger like..............SPANISH OAK (*Q. digitata*).

j^{2} Symmetrically arranged and generally in

k Two pairs; shrubs or very small trees.
BEAR OAK (*Quercus nana*).

k^{2} A single pair of wide-spreading lobes near a., or scarcely lobed and very wide at a.; a medium-size tree.
BLACK JACK OAK (*Q. Marilandica*).

g^{2} Sinuses wide, rounded and deep; lobes narrow, widening toward the apex, the larger with 1–4 spreading teeth or sometimes toothed lobes; acorn h Oblong and with

i Very shallow saucer-like cup.
Southern Red Oak (*Quercus Texana*).

i^2 Deep top-shaped cup about half enveloping the acorn.
Hill's Oak (*Q. ellipsoidalis*).

h^2 Subglobose, half enveloped by its deep turbinate cup of closely appressed scales......................Scarlet Oak (*Q. coccinea*).

h^3 Flattened-globose to almost hemispheric, with shallow saucer-shaped or slightly top-shaped cup................Pin Oak (*Q. palustris*).

f^2 Lobes rounded or bluntly pointed and acorns maturing in the autumn of the first year; lvs.

g Obovate-oblong, under surface

h Glabrous, larger lobes long and narrow, acorn about one-third invested by the cup..............................White Oak (*Q. alba*).

h^2 White-tomentose, lobes shorter and more triangular; acorn nearly enveloped by its thin-edged cup........Over-cup Oak (*Q. lyrata*).

g^2 Broad-obovate with

h 1 or 2 pairs of rounded lobes, the one next the apex much the largest and commonly trucate or with wide sinus at apex.
Post Oak (*Q. minor*).

h^2 3 or 4 pairs — deeply lyrate pinnatified; acorns generally large with fringed cup...........................Bur Oak (*Q. macrocarpa*).

c² MAIN RIBS SEVERAL — PALMATELY VEINED;
  d *Leaves alternate with*
    e 5–7 deep lobes — star-shaped; fr. globose head of capsules. SWEET GUM (*Liquidanbar Styraciflua*).
    e² 3–5 short lobes; b. of leaf-stem enveloping the new leaf-bud; fr. globose head of akenes............................SYCAMORE (*Platanus occidentalis*)
    e³ Not lobed, entire, orbicular-cordate; fr. pod. REDBUD (*Cercis Canadensis*).
  d² *Leaves opposite;* fr. samaras in pairs united at base.
    e Large or medium-size trees with rather firm lvs.;
      f Sinuses rounded at bottom and lobes entire or nearly so; sinuses
        g Moderately deep; lvs. pale and glabrous bn., without stipules. SUGAR MAPLE (*Acer Saccharum*).
        g² Shallow; lvs. green and pubescent bn., edges drooping; stipules often present................................BLACK MAPLE (*A. nigrum*).
      f² Sinuses pointed at bottom and lobes more or less toothed; lvs.
        g Deeply 5-lobed with narrow sinuses.....SILVER MAPLE (*A. dasycarpum*).
        g² Moderately 3–5-lobed with wide sinuses; under surface pale and
          h Glabrate; rather thin, subcordate b..........RED MAPLE (*A. rubrum*).
          h² Moderately hairy, especially along the veins, firm, mostly tapering and entire b. obovate-orbicular, small and sometimes without lobes. CAROLINA MAPLE (*A. Carolinum*).
          h³ Velvety pubescent, thick, wide-orbicular; a southern tree. DRUMMOND MAPLE (*A. Drummondii*).

e² Small trees or tall shrubs with membranaceous leaves; lobes

h Doubly serrate; lvs.

i Acuminate, 3-lobed at a. only, eastern.
STRIPED MAPLE (*A. Pennsylvanicum*).

i² Acute or obtuse, 3–5-lobed, or even 3-parted or 3-foliate, western.
DWARF MAPLE (*A. glabrum*).

h² Coarsely serrate-dentate, pubescent bn.
MOUNTAIN MAPLE (*A. spicatum*).

b² **Without well-marked blade and petiole** (latter present, but very small in leaves of Hemlocks);

c LEAVES LINEAR AND IN FLAT 2-RANKED SPRAYS,

d *Sessile,*

e Deciduous, soft, light green (those of fruiting-branchlets scale-like); fr. subglobose cones......................BALD CYPRESS (*Taxodium distichum*).

e² Evergreen, more rigid, dark green ab., whitish and keeled bn., leaving a flat or depressed scar when breaking away from branchlet; cones erect, 2 to 3½ in. long and falling apart at maturity.

f Bracts of cone shorter than scales..........BALSAM FIR (*Abies balsamea*).

f² Bracts longer than the scales, exserted and reflexed.
FRASER'S FIR (*Abies Fraseri*).

d² *With very small appressed petioles,*

e Leaves obtuse or rounded a.; cones less than 1 in. and with suborbicular scales which expand but little at maturity........HEMLOCK (*Tsuga Canadensis*).

e^2 Leaves notched or rounded a.; cones more than 1 in. and oblong scales expanding widely at maturity....CAROLINA HEMLOCK (*Tsuga Caroliniana*).

c^2 LEAVES SCALE-LIKE IMBRICATED AND CLOSELY APPRESSED OR AWL-SHAPED, in four ranks and making a conspicuously

d *Flat 2-edged branchlet;* cones ½ in. or less, with few leathery scales, 4 only being fertile..............................ARBOR VITAE (*Thuya occidentalis*).

d^2 *4-angled branchlet; fr.*

e Sublogobose cones, ¼ in., with peltate, valvate scales.

WHITE CEDAR (*Chamaecyparis thyoides*).

e^2 Fleshy, dark blue and glaucous berries (really modified cones);

f Leaves of two kinds, both scale like and awl-shaped; buds naked; fr.

g Maturing in autumn of first season.........RED CEDAR (*J. Virginiana*).

g^2 Maturing in autumn of second season.

ROCKY MOUNTAIN RED CEDAR (*J. scopulorum*).

f^2 Leaves all awl-shaped, buds scaly.......COMMON JUNIPER (*J. communis*).

c^3 LEAVES NEEDLE-SHAPED; FRUIT A CONE;

d *Leaves not in fascicles* (*scattered*), short, stiff, pointing every way, ridged above and below (4-sided), with woody and persistent bases;

e Branchlets pubescent and foliage

f Yellowish-green; cones 1¼–2 in., oblong-cylindrical, on stalks which are slightly if at all incurved; cones with subentire scales.

RED SPRUCE (*Picea rubens*).

f^2 Blue-green; cones ¾–1¼ in., with incurved stalks; cones with erose margined scales.........................**Black Spruce** (*Picea Marinana*).

e^2 Branchlets glabrous; cones oblong-cylindrical; about

f 2 in. long, with nearly orbicular scales, truncate and entire at apex. **White Spruce** (*Picea Canadensis*).

f^2 2½–4 in. long, with rhomboidal, flexuose scales, narrow erose-dentate and elongated at apex.......................**Blue Spruce** (*P. Parryana*).

d^2 *Leaves in fascicles,*

e Evergreen, quite stiff and in fascicles of

f 2 each, a membranaceous sheath inclosing the base of each fascicle, about

g 1 in. long, sheaths very short................**Jack Pine** (*P. divaricata*).

g^2 1½–2½ in. long; sheaths ⅛ in. or less; branchlets smooth and purple. **Jersey Pine** (*P. Virginiana*).

g^3 3–5 in. long; branchlets rough.

h Cones 1½–2 in., narrow ovoid, scales armed with weak prickles. **Yellow Pine** (*P. echinata*).

h^2 Cones 3–4 in., broad-ovoid, scales armed with very thick stout prickles. **Table-mountain Pine** (*P. pungens*).

g^4 5–6 in. long, thick and with smooth-bossed cones. **Red Pine** (*P. resinosa*).

f^2 3 each and 3–6 in. long; cones 1½–3 in..........**Pitch Pine** (*P. rigida*).

g^5 5–8 in. long; cones

h 2–3 in., globular-ovoid, persisting closed on the branches for some years. **Pond Pine** (*P. serotina*).

h² 3–5 in., narrow-ovoid, opening and discharging its seeds the year of maturity; resin-ducts in leaves near surface.
LOBLOLLY PINE (*P. Taeda*).

g⁶ 8–15 in., resin-ducts not near surface; cones cylindrical-ovoid, 6–10 in. long, breaking away from branch within its b.
LONG-LEAF PINE (*P. palustris*).

f³ Both 2 and 3 each; Rocky Mountain trees.
ROCK PINE (*P. ponderosa scopulorum*).

f⁴ 5 each, slender, 3–5 in.; cones 4–6 in., curved-cylindrical, with stems.
WHITE PINE (*P. Strobus*).

e² Deciduous, soft, short and in fascicles of many each (scattered on shoots of the season) .... TAMARACK (*Larix Americana*).

a² **COMPOUND LEAVES;**

b **Pinnately compound,**

c ALTERNATE AND

d *Entire;*

e Leaflets 3, subsessile, obovate-oblong, remotely crenate-serrate; fr. samara.
HOP-TREE (*Ptelea trifoliata*).

e² Leaflets 7–9, short-stemmed, ovate to suborbicular and alternately arranged; fr. pod .... YELLOW WOOD (*Cladrastis lutea*).

e³ Leaflets 9–13, short-stemmed, ovate-oblong, abruptly acuminate; fr. shining white drupelet .... POISON SUMACH (*Rhus vernix*).

e^4 Leaflets 11–21, short-stemmed, oblong, obtuse or rounded b., rounded and notched or bristle-tipped a.; fr. pod.

f Petioles and branchlets glabrous...........Locust (***Robinia Pseudacacia***).

f^2 Petioles and branchlets viscid...............Clamy Locust (***R. viscosa***).

e^5 12–25, short-stemmed, lance-falcate; fr. drupe.
Western Soapberry (***Sapindus Drummondii***).

d^2 *Entire, but remotely serrate toward* a.; stem winged between the leaflets; fr. crimson drupelets.......................Dwarf Sumach (***Rhus capallina***).

d^3 *Entire, but with 1–4 glandular teeth at* b.; fr. twisted samara.
Tree-of-Heaven (***Ailanthus glandulosa***).

d^4 *Serrate;*

e Leaflets 3–11, the lateral sessile, and successively larger towards the terminal one; fr. a nut enveloped in a 4-valved woody husk; leaflets

f 3–5, lanceolate; nut small, compressed,

g 4-angled; husk rather thick and parting to b.
Southern Shell-bark Hickory (***H. Carolinae-Septentrionalis***).

g^2 Scarcely angled, husk rough, very thin and splitting with difficulty if at all...........................Northern Hickory (***H. borealis***).

f^2 5, lance-ovate to obovate; fr. with very thick husk splitting freely to b.
Shag-bark Hickory (***H. ovata***).

f^3 Both 5 and 7; fruit

g More or less compressed pyriform; husk thin and tardily dehiscent; nut quite smooth and thick-shelled.........Pig-nut Hickory (***H. glabra***).

g^2 Subglobose with husk splitting freely; nut small,

  h Thin-shelled................Small-fruited Hickory (*H. microcarpa*).

  h^2 Thick-shelled......................Pale-leaf Hickory (*H. villosa*).

f^4 7–9, mostly obovate and large; fr. with thick free-splitting husk and thick-shelled ribbed nuts; petioles and new growths

  g Densely hirsute; bark with rough firm ridges (not shaggy); nut globular or little compressed................Mocker-nut Hickory (*H. alba*).

  g^2 Glabrous or pubescent; bark shaggy with long strips; nut very large, compressed.......................King-nut Hickory (*H. laciniosa*).

f^5 7–11, lanceolate to narrow obovate, the lower ones somewhat falcate; fr. with elevated sutures; nut with thin shell and generally bitter cornel.

  g Nut smooth, whitish and little compressed.
Bitter-nut Hickory (*H. minima*).

  g^2 Very rugose, ridged and compressed, brownish.
Water Hickory (*H. aquatica*).

f^6 9–11 lance-ovate, falcate; fr. cylindrical-oblong, husk thin.
Pecan (*H. Pecan*).

e^2 Leaflets 9–15, subsessile (except the terminal one) with reddish stems; fr. very small berry-like apples in loose cymose clusters; leaflets

  f Acuminate, glabrous and teeth scarcely spreading; leaf-buds glutinous.
American Mountain Ash (*Sorbus Americana*).

  f^2 Acute or obtuse a.

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g Leaf-buds with rusty appressed hairs; lfts. glabrate ab.; teeth spreading. LARGE-FRUITED MOUNTAIN ASH (*S. scopulina*).

g^2 Leaf-buds whitish tomentose; lfts. pubescent. ROWAN TREE (*Sorbus Aucuparia*).

e^3 Leaflets 11–19 and

f Sessile, viscid-pubescent as is all new growth; fr. nut with indehiscent husk.................................BUTTERNUT (*Juglans cinerea*).

f^2 Petiolulate, glabrous and leaf-stems spiny bn.; fr. capsule. PRICKLY ASH (*Xanthoxylum Clava-Herculis*).

e^4 Leaflets 13–25,

f Lance-ovate and green bn.; twigs glabrate; a large tree; fr. nut with indehiscent husk.....................BLACK WALNUT (*Juglans nigra*).

f^2 Lanceolate, pale pubescent bn.; twigs velvety; a small tree; fr. drupelets with crimson hair..................STAG-HORN SUMACH (*Rhus hirta*).

c^2 LEAVES OPPOSITE; LEAFLETS

d 3–7, entire at base, serrate or serrate lobed above; fr. samaras obliquely winged and in pairs jointed together at b.............BOX ELDER (*Acer Negundo*).

d^2 5–11 and fr. a straight samara with terminal wing.

e Samara with seed-bearing portion flattened and wing extending the entire length

f Lateral leaflets sessile; calyx in the fertile flowers none. BLACK ASH (*F. nigra*).

f^2 Lateral leaflets stalked; calyx present

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g Samara obovate to spatulate; twigs terete.
WATER ASH (*F. Caroliniana*).

g² Samara elliptic to spatulate; twigs 4-sided.
BLUE ASH (*F. quadrangulata*).

e² Samara with seed-bearing portion subterete; wing not extending to base; leaflets stalked; calyx present in fertile flower

f Wing almost entirely terminal — slightly if at all decurrent on body

g Leaves and branchlets glabrous or nearly so.
WHITE ASH (*F. Americana*).

g² Leaves beneath and branchlets pubescent.
BILTMORE ASH (*F. Biltmoreana*).

f² Wing decurrent somewhat on sides of body but not to base

g Wing of samara spatulate

h Branchlets and leaves glabrous or nearly so; leaves green beneath.
GREEN ASH (*F. lanceolata*).

h² Branchlets and petioles velvety pubescent

i Samara less than 2 in. long; calyx small.
RED ASH (*F. Pennsylvanica*).

i² Samara mostly 2 in. long or more; calyx enlarged.
PUMPKIN ASH (*F. profunda*).

g² Wing of samara long-linear........DARLINGTON ASH (*F. Darlingtonii*).

b² **Palmately compound**; fr. large coriaceous capsule; leaflets membranaceous and usually

c 7, lance-obovate, cuneate, apiculate a., wrinkled.
Horse Chestnut (*Aesculus Hippocastanum*).

c^2 5 (sometimes 6 or 7)

d Oval or oblong, subsessile or acute or short acuminate a.
Ohio Buckeye (*Aesculus glabra*).

d^2 Obovate-oblong, short-stemmed, acuminate.
Sweet Buckeye (*Aesculus octandra*).

a^3 **DECOMPOUND LEAVES;**

b Evenly bipinnate, with 8–12 pairs of pinnae each with many oblong oblique leaflets about ½ in. long; fr. pod.....................Mimosa Tree (*Albizzia Julibrissin*).

b^2 Irregularly bipinnate or sometimes ternate, single leaflets taking the place of some pinnae; petioles

c Armed with prickles; fr. many small dark purple berries.
Hercules Club (*Aralia spinosa*).

c^2 Unarmed; fr. large broad pods with large seeds and sweet pulp.
Coffee-tree (*Gymnocladus doicus*).

a^4 **BOTH COMPOUND AND DECOMPOUND LEAVES**, the former often in fascicles, tree armed with large branching thorns; fr. a shining

c Long contorted and twisted linnear many-seeded pod.
Honey Locust (*Gleditsia triacanthos*).

c^2 Short, oblique-ovate, 1-seeded pod.
Water Locust (*Gleditsia aquatica*)

GLOSSARY.

Achene or akene. A dry, hard, 1-celled and 1-seeded indehiscent fruit.

Acuminate. Tapering to a rather long point.

Acute. With a short sharp point.

Adnate. Closely united or growing to (literally "born with").

Æstivation. The arrangement of the parts of a flower in the bud.

Albumen. Nutritive material surrounding the embryo in some seeds.

Albumenous. Furnished with albumen.

Alternate. Not opposite; applied to leaves and flowers.

Ament. A spike of unisexual flowers, each subtended by a bract; a catkin.

Amphitropous. Said of a straight ovule or seed when half inverted.

Anatropous. Said of straight ovules or seeds when inverted, the micropyle being near the hilum.

Androgynous. Said of an infloresence composed of both staminate and pistillate flowers.

Angiospermous. Having seeds borne in a closed pericarp.

Anterior. Said of the side of an axillary flower away from the main axis or stem.

Anther. The portion of a stamen which contains the pollen.

Anthesis. The time of the opening of a flower.

Apetalous. Without petals or corolla.

Apiculate. With a short pointed tip.

Arcuate. Curved.

Aril. An appendage growing about the hilum of a seed.

Aristate. Terminating in an awn or bristle.

Articulated. Joined by a more or less easily separable joint.

Ascending. Growing upward.

Auriculate. Furnished at base with ear-like lobes.

Attenuate. Long-tapering.

Awn. A bristle-like appendage.

Awned. Furnished with awns.

Axil. The upper angle between the leaf and the stem or branch which bears it.

Axillary. Of or from the axil.

Axile. Situated in the axil.

Baccate. Berry-like with fleshy pulp.

Berry. A fruit with wholly pulpy pericarp.

Bifid. Two-cleft.

Bipinnate. Twice pinnately compound.

Bract. Altered scale-like leaf of an inflorescence.

Bractlet. Diminiutive of bract, a secondary bract.

Bracteate. Furnished with bracts.

Bracteolate. Furnished with bractlets.

Caducous. Falling very early — earlier than deciduous.

Calyx. The outer of the two series of floral envelopes.

Calyx-tube. The tube formed by the union of the sepals.

Campanulate. Bell-shaped.

Campylotropous. Said of an ovule or seed which is curved, so that the micropyle and hilum are near together.

Canescent. Hoary with a whitish subescence.

Capitate. Forming a head.

Capsular. Pertaining to a capsule.

Capsule. A dry dehiscent fruit formed from two or more carpels.

Carinate. Having a keel-like median ridge.

Carpel. A simple pistil or element of a compound pistil.

Carpillary. Of or belonging to a carpel.

Caruncle. An appendage at the hilum of a seed.

Catkin. An ament.

Caudate. With a tail-like appendage.

Chalaze. The point of attachment of an ovule or seed with its coats.

Chartaceous. Having a paper-like texture.

Ciliate. Fringed with small hairs on margin like miniature eye-lashes.

Ciliolate. Minutely ciliate.

Cinereous. Of an ash-gray color.

Circinate. Coiled from the top down.

Clavate. Club-shaped.

Cleistogamous. Fertilized in the bud.

Claw. The narrow stalk-like base of petal, sepal, etc.

Cleft. Cut about to the middle.

Coccus. (pl. cocci) One of the portions into which a lobed fruit with 1-seeded cells splits.

Cochleate. Spiral; like a snail-shell.

Columella. The persistent axis of some capsules, etc.

Coma. The hairs at the end of some seeds.

Comose. Furnished with a coma.

Compound. Composed of two or more similar parts, as a leaf with several blades.

Compressed. Flattened laterally.

Conduplicate. Folded together lengthwise.

Connate. United or grown together.

Connective. The portion of a stamen which connects the anther-cells.

Connivant. Coming in contact.

Convulate. Rolled together lengthwise.

Cordate. Heart-shaped.

Coriaceous. Leather-like in texture.

Corolla. The inner of the two series of floral envelopes.

Corymb. A form of flower-cluster which is flat-topped and the sequence of flowering is from the margin inward, and the outer pedicels longest.

Corymbose. Arranged in corymbs.

Cotyledon. A seed-leaf or rudimentary leaf of an embryo.

Crenate. Scalloped.

Crenulate. Finely crenate.

Cuneate. Wedge-shaped.

Cuspidate. Tipped with a sharp rigid point.

Cyme. A form of flower-cluster usually flattened above with the sequence of flowering from within outward and the outer pedicels longest.

Cymose. Bearing cymes, or in cymes.

Deciduous. Not persistent; falling away.

Decompound. More than once compound.

Decumbent. Reclining but with ascending top.

Decurrent. Said of leaves where the blade runs down on the petiole.

Decussate. Said of opposite leaves when the successive pairs are arranged at right angles to each other.

Deflexed. Bent abruptly downward.

Dehiscent. Opening, as of an anther or capsule, to emit contents.

Deltoid. Of the shape of the capital Greek letter Delta. △

Dentate. Toothed, with pointed teeth directed outward.

Denticulate. Diminutive of dentate.

Diadelphous. Said of stemens which have filaments united into two sets.

Diandrous. Having two stamens.

Dichotomous. Branching regularly in pairs.

Dicotyledonous. Having two cotyledons.

Didymous. Twin, *i. e.*, in pairs.

Didynamous. Said of stamens to indicate two pairs of unequal length.

Digitate. Said of an arrangement, as of leaflets, suggestive of the fingers of one's hand.
Dimorphous. Of two forms.
Diœcious. With staminate and pistillate flowers on different plants.
Discoid. Resembling or pertaining to a disk.
Disk. A development of the receptacle of some flowers at the base of a pistil.
Dissepiment. The partition of an ovary or capsule.
Distichous. Arranged in two vertical ranks.
Distinct. Separate from each other.
Divaricate. Widely divergent.
Dorsal. Pertaining to the back, as of the outer angle of a carpel.
Drupaceous. Resembling a drupe.
Drupe. A simple indehiscent fruit with fleshy exterior (pericarp) and bony usually 1-seeded interior (endocarp); as a plum or peach.
Drupelet. Diminutive of drupe.
Duct. An elongated cell or tube found in woody stems.
Echinate. Covered with prickles.
Eglandular. Without glands.
Elliptical. With the outline of an ellipse.
Emarginate. Slightly notched at apex.
Embryo. The rudimentary plant while in the seed.
Endocarp. The inner portion of a pericarp.
Endogenous. Said of the stems of plants which increase in thickness by a growth within — not external layers.
Entire. Said of leaves, etc., when the margin is not notched or toothed.
Epicarp. The thin outer layer of a pericarp.
Epigynous. Borne upon the ovary.
Epipetalous. Borne upon the petals.
Epiphyte. Said of plants growing upon other plants but not deriving nourishment from them.
Equitant. Astride. Said of leaves which enfold each other in two ranks.
Erose or Erroded. Irregular, as though gnawed.
Exalbumenous. Without albumen.
Excurrent. Extending beyond the apex.
Exfoliating. Cleaving off, as of the outer layers of bark.
Exocarp. The outer layer of a pericarp.
Exogenous. Said of stems which increase in thickness by the growth of layers outside of the wood and inside of the bark.
Exserted. Projecting beyond the surrounding organs.

Exstipulate. Without stipules.
Extrorse. Said of anthers which open outward.
Falcate. Scythe-shaped.
Fascicle. A bundle or cluster.
Fasciculate. Arranged in fascicles.
Farinose. Covered with meal-like powder.
Feather-veined. With veins projecting from midrib suggestive of a feather.
Fastigiate. Said of branches which are erect and near together.
Ferruginous. Rust-colored.
Fertile. Said of flowers (or the branches which bear them) producing seeds or fruit.
Fibro-vascular. Containing woody fibres and ducts.
Filament. The portion of a stamen supporting the anther; a thread-like substance.
Filamentous or Filamentose or Filiform. Thread-like or composed of threads.
Fimbriate. With fringed margin.
Fistular or Fistulose. Hollow like a tube.
Flabellate. Fan-shaped.
Flaccid. Lax, not rigid.
Fleshy. Succulent, juicy.
Flexuose. Zigzag or sinuous.
Floccose. Covered with soft woolly hair.
Foliaceous. Of a leaf-like nature.
Foliate. Having leaves.
Foliolate. Having leaflets (the number usually indicated by a number prefixed).
Follicle. A pod dehiscent along the ventral suture only.
Follicular. Similar to a follicle.
Free. Not adnate to another organ.
Friable. Breaking easily.
Frutescent or Fruticose. Of a shrubby nature.
Fugacious. Falling away very early.
Funicle or Funiculus. The stalk of an ovule or seed.
Fuscous. Grayish brown.
Fusiform. Spindle-shaped.
Gamopetalous. Having petals more or less united.
Gibbous. Swollen or extended on one side.
Glabrate. Nearly or becoming glabrous.
Glabrous. Smooth—without hairs or roughness of any kind.
Gland. Secreting cell or group of cells or a protuberance resembling same.
Glandular. Supplied with glands.
Glaucescent. Becoming or nearly glaucous.
Glaucous. Furnished with a bluish or whitish bloom, as seen on the cabbage leaf.
Globose. Spherical or nearly so.

Gymnosperm. (adj. Gymnospermous) A plant having naked ovules or seeds not inclosed in an ovary.

Gynœcium. The pistil or pistils collectively.

Gynophore. The stipe or stalk of a pistil.

Habit. The form or general appearance of a plant.

Habitat. The area over which a species is found.

Hastate. Shaped like an arrow-head but with lobes directed outward.

Head. A dense cluster of sessile or nearly sessile flowers.

Heart-wood. The mature and usually darker colored central portion of an exogenous trunk.

Hilum. The scar or place of attachment of an ovule or seed.

Hirsute. Covered with rather coarse stiff hairs.

Hispid. Covered with bristly stiff hairs.

Hoary. Covered with fine grayish pubescence.

Hybrid. A cross between two species.

Hypogenous. Growing from beneath the ovary.

Imbricated. Overlapping like the shingles of a roof.

Imperfect. Applied to flowers indicates that either pistils or stamens are lacking.

Incised. Cut into rather deeply.

Included. Said of stamens which do not project beyond the perianth.

Incomplete. Applied to flowers in which one or more of the four sets of floral organs are wanting.

Incumbent. Lying upon, as the radical against the back of a cotyledon.

Indehiscent. Not opening at maturity.

Induplicate. With edges folded inward.

Inequilateral. Unequal-sided.

Inferior. Said of an overy when it is adnate to the calyx-tube.

Inflorescence. The arrangement of a flower-cluster.

Innate. Said of an anther when it is seated, as it were, on the end of a filament.

Internode. The portion of a stem between the points from which the leaves grow.

Interpetiolar. Between the petioles.

Introrse. Facing inward.

Involucrate. Furnished with an involucre.

Involucre. A whorl of bracts subtending a flower.

Involute. With sides rolled inward.

Irregular. Said of flowers in which similar parts differ in size or form.

Keel. A central ridge; also the united anterior petals of a papilionaceous flower.

Key. A dry winged indehiscent fruit; a samara.

Laciniate. Cut into long irregular teeth.

Lamella. (pl. Lamellæ) A thin flat scale or plate.

Lamellate. Composed of lamellæ.

Laminate. Consisting of plates.

Lanceolate. Lance-shaped, wide below and tapering to apex, but narrower than ovate.

Leaflet. One of the small blades of a compound leaf.

Legume. A simple dry fruit, composed of a single carpel and dehiscent usually along both sutures; a pod, as of the Pea.

Leguminous. Producing legumes.

Lenticel. Small lens-shaped corky growths seen in young barks.

Lenticular. Lens-shaped.

Lepidote. Bearing small scurfy scales.

Ligulate. Strap-shaped, or provided with ligules, descriptive of corollas, etc.

Limb. The expanded part of a petal or sepal.

Linear. Descriptive of a narrow leaf with margins approximately parallel, as a blade of grass.

Lobed. Divided with rather deep sinuses.

Loculicidal. Said of capsules which open into the sell along the dorsal suture.

Loment. A pod constricted between the seeds.

Lyrate. Lyre-shaped; said of pinnatifid leaves where the terminal segment is largest.

Marcescent. Withering but still persisting.

Medulla. The central pith-column of exogenous stems.

Medullary-rays. Lines of specialized cells of woods radiating from the pith-column to the bark.

Micropyle. The orifice of an ovule or the corresponding point of a seed.

Midrib. The main central rib of a leaf; the mid-vein.

Monadelphous. Stamens with filaments united.

Moniliform. Resembling a string of beads.

Monocotyledonous. With a single cotyledon.

Monœcious. With stamens and pistils on the same plant but in different flowers.

Monopetalous. With petals united.

Mucro. A small abrupt tip.

Mucronate. Furnished with a mucro.

Muricate. Rough with short rigid points.

Naturalized. Said of introduced plants which are reproducing by self-sown seeds.

Nectar. A sweet secretion in flowers, which becomes honey after being gathered by bees.

Nectariferous. Bearing nectar.

Nectary. An organ secreting nectar.

Nerve. A simple or unbranched vein.

Node. The place on a stem where the leaves appear.

Nodose. Knotty.

Nut. A hard 1-celled, 1-seeded indehiscent fruit.

Nutlet. Diminutive of nut.

Obconic. Inversely conical.

Obcordate. Inversely heart-shaped.

Oblanceolate. Inversely lanceolate, *i. e.*, broader towards the apex.

Oblique. Slanting or with unequal sides.

Oblong. Longer than broad, and widest near the center.

Obovate. The inverse of ovate, *i. e.*, broader towards the apex.

Obovoid. The inverse of ovoid.

Obtuse. Bluntly pointed; greater than right angle.

Opposite. Said of leaves or leaflets arranged in pairs on opposite sides.

Orbicular. Circular.

Orthotropous. Descriptive of a straight erect ovule with hilum at one end and micropyle at the other.

Oval. Broadly elliptical, broader than "oblong."

Ovary. The ovule-bearing portion of a pistil.

Ovate. Applied to leaves, etc., which are egg-shaped in outline, broader towards base.

Ovoid. Egg-shaped, applied to solids, broader near base.

Ovule. The embryonic seed.

Ovuliferous. Bearing ovules.

Palmate. Hand-shaped, with lobes or leaflets radiating from apex of petiole like fingers.

Panicle. A compound raceme.

Paniculate. Arranged in panicles.

Papilionaceous. Butterfly-like, descriptive of flowers of the Pea family.

Papillose. Rough with minute blunt projections.

Parietal. Pertaining to the wall, as of an ovary.

Parted. Divided but not entirely to base.

Pectinate. Pinnatifid with narrow close comb-like teeth.

Pedicel. The stalk of a single flower in a flower-cluster.

Pedicellate. Borne on a pedicel.

Peduncle. The stalk of a flower-cluster or of a solitary flower.

Pedunculate. Borne on a peduncle.

Peltate. Shield-shaped. A flat organ attached by a central stem.

Perennial. Lasting for more than two years.

Perfect. Said of flowers which have both stamens and pistils.

Perfoliate. Said of leaves through which the stems seem to pass.

Perianth. The calyx and corolla of a flower collectively.

Pericarp. The matured wall of an ovary.

Perigynous. Said of a perianth united with the ovary a portion of its length.

Persistent. Remaining long attached to the organs supporting them; as leaves attached over winter; or calyx-lobes after the flowering season.

Petal. One of the divisions of a corolla.

Petaloid. Resembling or colored like a petal.

Petiolate. Having a petiole.

Petiole. The stalk or stem of a leaf.

Petiolulate. Having a petioule.

Petioule. The stalk of a leaflet.

Phyllodium. A specialized petiole resembling or performing functions of a leaf.

Pilose. Hairy with long soft hairs.

Pinna. (pl. Pinnæ) One of the first divisions of a bipinnately compound leaf.

Pinnate. Said of compound leaves with leaflets arranged on opposite sides of a stem — the rachis.

Pinnatifid. Pinnately cleft to the midde or farther.

Pinnule. A secondary pinna.

Pistil. The central organ of a perfect flower in which the seeds are produced.

Pistillate. Provided with a pistil.

Placenta. (pl. Placatæ) The portion of the interior of an ovary which bears the ovules.

Plicate. Said of leaves folded or plaited (like a fan) in the bud.

Plumule. The bud or terminal of an embryo.

Pollen. The fertilizing grains or element of the stamen.

Polliniferous. Bearing pollen.

Polygamous. Bearing both perfect and imperfect flowers.

Polypetalous. Having separate petals.

Pome. A fleshy fruit resulting from the development of an ovary and an adnate calyx-tube, as the apple.

Posterior. Said of the side of an axillary flower towards the axis.

Prickle. A small spine growing out from the bark.

Procumbent. Trailing or resting on the ground.

Puberulent or Puberulous. With very short fine hairs.

Pubescence. A covering of soft fine hairs.

Pubescent. Covered with short soft hairs, *i. e.*, pubescence.

Pulvinate. Cushion-shaped.

Punctate. Bearing translucent or colored dots or pits.

Punctulate. Minutely punctate.

Putamen. The hard part of a stone-fruit; a pit.

Raceme. A form of flower-cluster where the flowers are arranged with pedicels of about equal length on an elongated axis and sequence of flowering from base towards apex, as in the currant.

Racemose. In racemes.

Rachis. The central axis of a compound leaf or of a spike or raceme of flowers.

Radial. Said of a longitudinal section of a stem when on the radius.

Radicle. The portion of an embryo below the cotyledons.

Ramification. Branching.

Ramose, or Ramous. Branching like the limbs of a tree.

Ray. A branch of an umbel; also the marginal flowers of an inflorescence when distinct from the inner flowers.

Receptacle. The portion of a flower bearing the sepals, petals, etc.

Recurved. Curved backward.

Reflexed. Bent abrupty backward.

Reniform. Kidney-shaped.

Repand. With slightly wavy margin.

Reticulate. Netted.

Retrorse. Turned backward.

Retuse. With very shallow notch at apex.

Revolute. Rolled backward from the sides.

Raphe (or Rhaphe). The ridge connecting the hilum and chalaza of an anatropous or amphitropous ovule.

Ringent. Said of a gaping mouth of a two-lipped corolla.

Rostrate. With a beak-like tip.

Rotate. Said of a corolla with flat round limb; wheel-shaped.

Rugose. Wrinkled.

Ruminate. Said of an albumen which looks as if it had been chewed.

Runcinate. Incised with segments directed backward.

Sagittate. Of the shape of an arrow-head.

Salver-shaped. Said of a corolla with slender tube and abruptly expanded flat limb.

Samara. A simple dry indehiscent winged fruit.

Scabrous. Rough.

Scarious. Membranous, thin and dry; not green.

Secund. Said of a raceme where flowers are borne on one side of the rachis.

Sepal. One of the divisions of a calyx.

Septicidal. Said of a capsule opening along the partitions between the cells.

Serrate. Having saw-like teeth directed forward.

Serrulate. Diminutive of serrate.

Sessile. Without stalk.

Setaceous. Bristle-like.

Setose. Covered with bristles.

Setulose. Covered with minute bristles.

Simple. Of one piece, *i. e.*, not compound.

Sinuate. With markedly wavy margin.

Sinus. The cleft or space between two lobes.

Spatulate. Shaped like a spatula; abruptly wide at apex and narrow below.

Spicate. Arranged in a spike.

Spike. An elongated flower-cluster with sessile or nearly sessile flowers.

Spine. A sharp woody outgrowth from a stem.

Spinose. Covered with spines.

Spinule. Diminutive of spine.

Spinulose. Covered with spinules.

Stamen. One of the male or pollen-bearing organs of a flower.

Staminate. Said of flowers which bear stamens without pistils.

Staminodium. A sterile stamen.

Standard. The upper dilated petal of a papilionaceous flower.

Stellate. Star-shaped.

Stigma. The portion of a pistil which receives the pollen and through which fertilization is effected.

Stigmatic. Belonging to or of the nature of a stigma.

Stipe. The stalk-like support of some pistils.

Sterile. Not productive of spores or seeds.

Stipel. An appendage of some leaflets corresponding with the stipules of a leaf.

Stipitate. Having a stipe.

Stipulate, Having stipules.

Stipules. Appendages on either side of a leaf at the base of the petiole.

Stolon. A runner or prostrate branch rooting at the nodes.

Stoloniferous. Bearing stolons.

Stoma. (pl. Stomata) A little mouth or breathing pore in the epidermis (chiefly of the leaves) through which transpiration occurs.

Stomatiferous. Bearing stomata.

Striated. Striped lengthwise.

Strobile. A cone.

Style. The part of a pistil connecting the ovary and stigma.

Sub-. A prefix indicating somewhat; as subcordate, somewhat cordate, etc.

Subulate. Awl-shaped.

Suffrutescent. Somewhat shrubby.

Suffruticose. Diminutively shrubby.

Sulcate. Furrowed or grooved.

Superior. Said of an ovary growing above or free from the calyx.

Symmetrical. Said of a flower in which there is the same number of parts in each set of organs.

Syncarp. A fleshy multiple fruit.

Tangential. Said of a wood section when made lengthwise of the grain and tangentially to the rings of growth.

Tegmen. The inner lining of a seed.

Terete. Columnar; circular in cross-section.

Ternate. Arranged in threes.

Testa. The outer covering of a seed.

Thyrsoid. Like a thyrsus.

Thyrsus. A compact panicle; as a bunch of grapes or lilac flowers.

Tomentose. Densely pubescent; covered with tomentum.

Tomentulose. Diminutive of tomentose.

Tomentum. Dense matted hairs.

Torose. Cylindrical with contractions at intervals.

Torulose. Diminutive of torose.

Torus. The receptacle of a flower.

Tortuous. Considerably bent or twisted.

Trachæ. The ducts or canals in wood.

Tracheïds. Wood cells.

Transverse. Said of a wood section when made across the grain or axis of a log.

Tri-. In composition, thrice or three.

Triandrous. Having three stamens.

Trichotomous. Three forked.

Trifoliate. Having three leaflets.

Truncate. Ending abruptly, as if cut off.

Tuberculate. Covered with rounded projections.

Tumid or Turgid. Swollen.

Turbinate. Top-shaped.

Umbel. A form of flower cluster in which the pedicels radiate from the same point, similar to the rays of an umbrella.

Umbellate. Borne in umbels.

Umbellet. A secondary umbel.

Umbo. A projection or boss.

Umbonate. Bearing an umbel.

Undulate. With wavy margin.

Unguiculate. Contracted into a claw.

Uni-. In composition, one; as unisexual, of one sex, etc.

Urceolate. Urn-shaped.

Utricle. A bladder-like organ; a small 1-seeded fruit with a bladder-like pericarp.

Valvate. Said of sepals, etc., which are in contact along their margins only (not over-lapping) in the bud.

Valve. One of the parts into which a capsule splits.

Vascular. Possessing ducts or vessels.

Vein. One of the main branches of the framework of a leaf.

Veinlet. A branch of a vein.

Venation. The arrangement of veins.

Ventral. Pertaining to the anterior or inner face of an organ; opposed to dorsal.

Ventricose. Inflated on one side.

Vernation. The arrangement of leaves in the bud.

Verrucose. Covered with wart-like elevations.

Versatile. Said of an anther attached at about its middle and swinging freely.

Verticil. A whorl.

Verticillate. Arranged in a whorl.

Villous or Villose. Covered with long soft not matted hairs.

Virgate. Slender or wand-like.

Viscid. Sticky, glutinous.

Whorl. An arrangement of three or more leaves or branches radiating in a circle from the same node.

Wing. A thin filmy expansion.

ANNOUNCEMENTS.

As stated in our preface, the Leaf Key is not intended to take the place of a more comprehensive manual or treatise on the trees, but rather to supplement such a work. As information which we hope may be of interest to those who would go further in the study of trees than the meagre outlines of this key, we mention in the following pages our other publications on American trees and allied lines, to which we invite attention.

They are taken up in detail as follows:

PAGES
HANDBOOK OF THE TREES OF THE NORTHERN STATES AND CANADA, Photo-descriptive 52–55
AMERICAN WOODS, Illustrated by *actual specimens* 56–59
Preparations of Woods for Stereopticon 60–61
Preparations of Woods for Microscope 61
Views of Typical Trees, their Leaves, Flowers, Fruits, Barks and Leafless Branchlets, both as Photographs and Stereopticon Slides 63

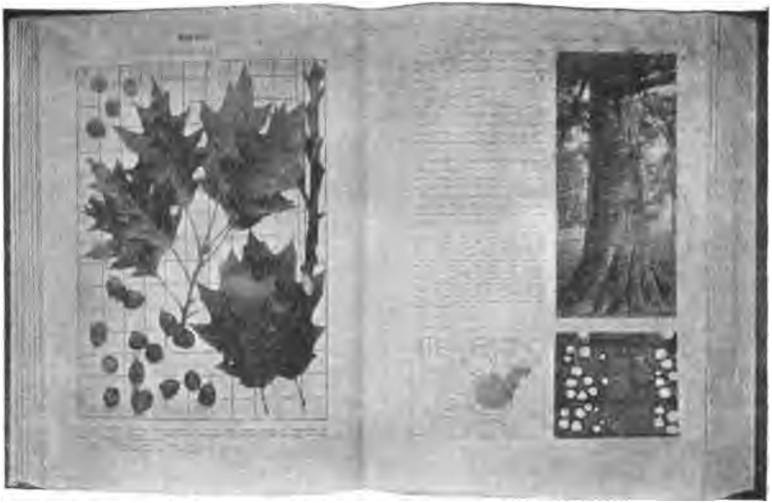
List of species represented in the various Parts of American Woods, and in the Preparations for Stereopticon and Microscope, in Views of Trees, etc., furnished on request.

Address Romeyn B. Hough Company, Lowville, N. Y.

HANDBOOK OF THE TREES

OF THE NORTHERN STATES AND CANADA, EAST OF THE ROCKY MOUNTAINS.

PHOTO-DESCRIPTIVE.



Observe that two pages facing each other are devoted to a species. In this way all of the native and naturalized trees are treated. Size of page is 6¾ by 9¼ in.

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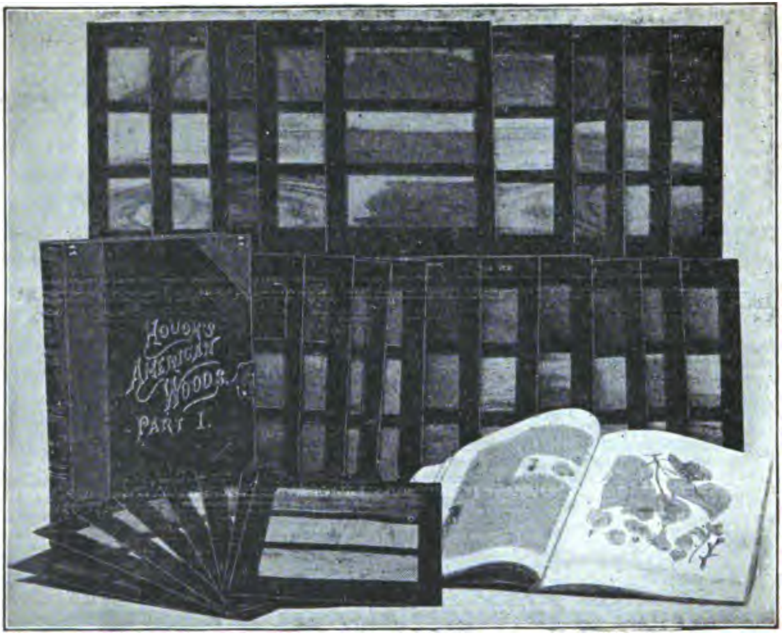

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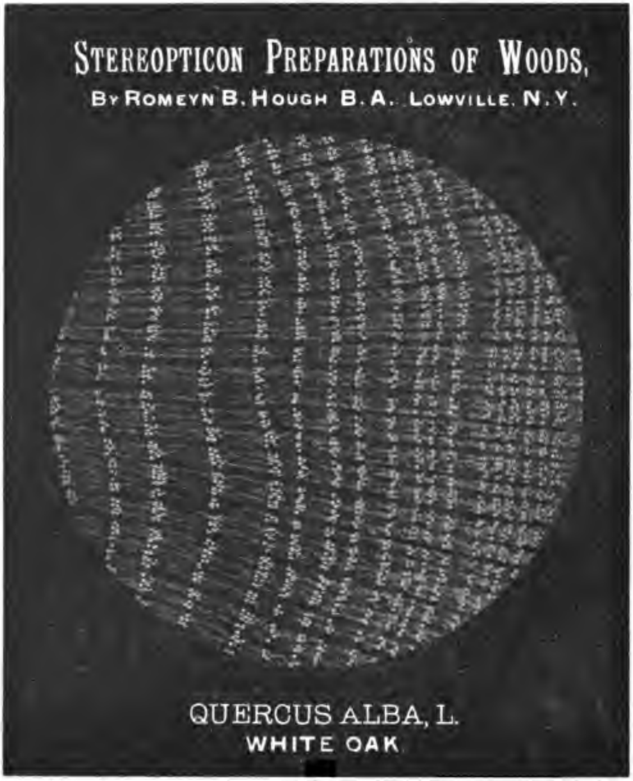
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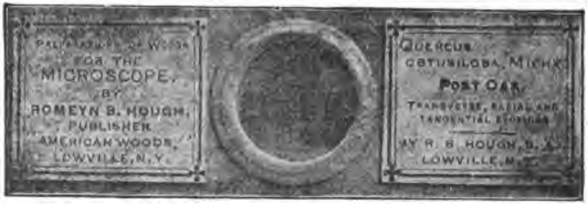

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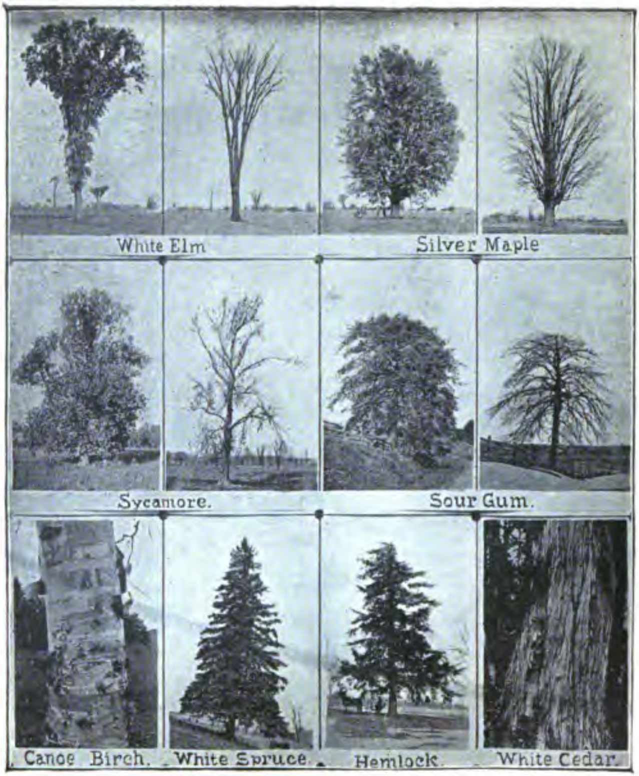

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